Promoting Waste Degrowth and Environmental Justice at a Local Level: the Case of Unit-Pricing Schemes in Spain

ABSTRACT

This paper investigates the introduction of unit-pricing (UP) schemes in waste management with regard to grassroots initiatives promoting bottom-up participatory processes in local communities, addressing several issues concerning environmental justice and degrowth. As waste service charges and fees increase in proportion of waste generated in presence of UP schemes, the paper explores and evaluates the socio-economic impact of these schemes at a local level, analysing data and information gathered from four municipalities in Spain. Findings indicate that UP schemes can provide a more balanced payment system for local residents, and help reducing free-rider behaviours associated with illegal and improper disposal practices. In addition, findings provide empirical evidence of the importance of grassroots initiatives in relation to increasing awareness regarding environmental issues among the public, and in view of facilitating change towards more sustainable practices within local communities. Conclusions gathered from this study offer valuable insights to local and national policymakers with regard to the design and delivery of UP schemes in waste management services.

Key words: Unit-pricing, Waste Degrowth; Environmental Justice; Environmental Justice Organizations; Political Ecology

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1. Introduction

Since the early 2000s, the European Commission (EC) has been promoting the creation of a circular economy associated with a 'zero waste' policy by combining policy actions and initiatives with a network of grassroots organizations and municipalities (EU Commission, 2014). However, zero waste is challenging to achieve. Related policies frequently generate conflicts between environmental justice organisations (EJOs hereafter)[1] working to facilitate and foster circular economy initiatives, and industrial ventures which tend to pursue capital-intensive, energy-to-waste schemes, and accumulation by contamination strategies (Martinez-Alier and Demaria 2017).

These conflicts, as well as publicly supported zero waste initiatives, push firms operating in the waste management sector to transform waste materials into more sustainable uses (Young et al., 2010), with differences across countries. For instance, as modern integrated waste management practices help to achieve significant reductions of greenhouse gas emissions (GHGs), many countries tend to reduce GHGs by increasing recycling rates (Chen and Lo, 2016). However, in countries where increasing recycling rates is not a priority, waste management solutions such as unit-pricing (UP hereafter) can be introduced at a local level.

UP is a model for the disposal of municipal solid waste, which addresses both consumption and end-of-life waste management. With UP, resident households pay for waste management services based on the individual quantity of waste they produce, with waste charges and fees increasing in proportion of waste generated. UP schemes and procedures can be designed and delivered in different ways: where door-to-door (DtD) apply, UP can be applied by identifying one or several refuse fractions (e.g. organic, metal) and charging users according to generated volumes and/or frequency of collection, or using prepaid standardized bags for refusals. Conversely, where waste is collected through street containers, UP is applied by assigning containers to specific users and by measuring individually generated volumes or weights for one or more waste fractions (ARC and ENT, 2010).

In presence of UP, waste management services are treated like any other utility (e.g. electricity or water supplies) and charged by unit of waste produced (Bilitewski, 2008). By reason of this, some authors do not consider UP schemes very effective from an environmental perspective, as these schemes may stimulate free-riding behaviours, 'waste tourism' (waste produced in a given community moved to neighbouring communities; van Beukering et al., 2009), and illegal and improper practices (e.g. Massarutto, 2007).

[1] For the purpose of this paper, EJOs are defined as usually non-profit and mostly non-governmental organizations actively campaigning for sustainable solutions in environmental policies, promoting a full engagement of all the segments of communities and societies in relation to designing, developing and enforcing environmental laws and regulations (EPA 2018).

Despite the abundance of studies on UP, many questions about its ecological and social impact remain still unaddressed, and literature presents some contradicting evidence particularly concerning waste tourism, inappropriate disposal, fairness and justice, and resistance. To fill these research gaps, the study we present in this paper explores and examines UP schemes by investigating processes and results in four Spanish municipalities where these schemes have been introduced for both commercial and household waste. In Spain and worldwide, an increasing number of bottom-up initiatives have been developing and/or supporting waste fee systems based on a re-balanced distribution of costs among residents based on per capita waste generation (Kelleher et al. 2005), with the objective to reduce waste impact and achieve more sustainable transformations in urban areas (Weber et al., 2017).

We argue that these initiatives are conducive to a) *consequential environmental justice*, because they contribute to a fairer allocation of costs of waste management even if they are far away from a 'fair' distribution; (Batllevell and Hanf 2008); b) *deontological environmental justice*, because they aspire to setting up fairer decision-making processes aimed at designing, developing and implementing waste-related environmental policies (Weber et al., 2017); and c) degrowth, because they aim to achieve more sustainable socio-metabolic patterns of waste management (Schneider et al., 2010). We investigate these claims by exploring the role of grassroots EJOs in the implementation of waste management policies in small municipalities and their relevance in promoting more sustainable waste management practices in Spain. In addition, we address waste reduction processes in urban areas by analysing waste management schemes that favour DtD collection, minimize incineration and landfilling. These schemes are proxies for a narrow interpretation of waste degrowth - e.g. the material decreasing of waste generation; and allow for a broader understanding of what degrowth really means – e.g. the introduction of fairer and more sustainable socio-metabolic arrangements.

In light of these considerations, we propose and address the following research questions:

1. What is the role of local grassroots EJO organizations and bottom-up initiatives with regard to both consequential and deontological environmental justice, and in relation to waste management?
2. How do UP schemes relate to issues such as waste tourism, inappropriate disposal, fairness and justice, and resistance?
3. How does a fairer distribution of costs and benefits in waste management practices generate waste degrowth and sustainable urban transformations?
4. How does fairness affect and shape environmental justice, UP and waste management practices from a theoretical perspective?

The paper comprises six sections, including this brief introduction. Section two addresses and explains main concepts such as environmental justice and degrowth, focusing on waste degrowth and waste justice and linkages with waste policies and UP schemes. Section three introduces and describes the municipalities selected for our investigation. Section four illustrates the methodology used to our study, examining quantitative and qualitative information gathered from our

investigation. Section five discusses main findings and results, expanding on possible implications for policies and initiatives and providing conclusions.

2. Theoretical and case study background

2.1 Environmental justice, degrowth, waste justice, and waste degrowth

Environmental justice can be defined as a social movement that strives for a fairer and more equitable dissemination of environmental positive and negative externalities (Martinez-Alier, 2012), and as an interdisciplinary field of social sciences including theories of the environment and justice and political ecology (Schlosberg, 2009). The concept of environmental justice originates in North America, forming upon the interrelations of notions such as racism, inequality, environmentalism, lodging; and the absence of public participation in community decisions (Schlosberg 2009). In Europe, however, environmental justice is more directly associated with issues concerning environmental quality, social deprivation and equity, and sustainable development (e.g. Petts 2005). Many European scholars investigated how community benefits might serve environmental justice, for instance addressing the unequal distribution of environmental and economic costs and benefits (Cowell et al., 2011). Waste facilities siting and waste dumping cause environmental justice conflicts worldwide (Demaria and D'Alisa, 2011), and waste mismanagement and trafficking are at the core of the literature addressing environmental justice (Pellow, 2004).

The concept of degrowth (French: *decroissance*; German: *Postwachstum*) is mainly based on the work of Georgescu-Roegen (e.g. 1975) and Latouche (2006), subsequently developed by Boillat et al. (2012), Demaria et al. (2013), and D'Alisa et al. (2014). Our analysis draws on the definition of degrowth provided by Kallis (2011), with degrowth intended as 'a socially sustainable and equitable reduction (and eventually stabilisation) of society's throughput' (p. 874). Activists and organisations promoting degrowth frequently oppose any development projects addressing waste disposal issues, as 'increased social metabolism is causing more and more conflicts on resource extraction and waste disposal' (Martinez-Alier 2012, p. 51)

Martinez-Alier (2012) was probably the first to associate the environmental justice movement with the emerging degrowth movement: 'EJOs are potential allies of environmental groups in rich countries that criticize the obsession with narrow economic measure of Gross Domestic Product (GDP) growth, which defines economic growth in the mainstream and permeates the political sphere' (p.51). However, several studies demonstrate the injustice affecting the social distribution of environmental risks (Martinez-Alier et al., 2014), not least arising from waste management (Petts, 2005).

As a concept, environmental justice comprises some derivatives, such as climate justice. In this paper, we introduce the term 'waste justice', defining it as a new and growing social movement that includes a variety of progressive political, economic and ecological currents, aside local grassroots initiatives, campaigning to minimize and eventually eliminate waste as by-product of our non-circular modes of production. Since climate change is basically a by-product derived from

production and consumption activities (e.g. generation of CO_2 and other GHGs), waste justice is frequently used interchangeably with climate justice. However, waste justice specifies and frames the global waste emergency within political and ethical contexts - in lieu of those purely technical or biophysical - by relating the effects of global waste contamination to the notions of environmental justice and social justice, and by encompassing issues such as equality, human rights, collective rights, and historical consciousness. Frequently, those who bear little or no responsibilities for climate change suffer its gravest consequences, and this applies also with regard to the impact of waste production and distribution. Equally, those benefiting least from global capitalistic production and waste trajectories tend to be most exposed to the effects of global waste contamination e.g. impoverished neighbourhoods are frequently selected for siting toxic waste facilities, and nuclear waste repositories are often located in rural and remote communities due to large and stable geological formations of their soil (Martinez-Alier et al., 2016). Therefore, we use waste justice to identify a type of justice which specifically addresses an increasing range of global issues caused by waste production and disposal, e.g. the growing contamination of livelihoods of indigenous people and communities, or the progressive polluting of areas traditionally considered pristine such as the Himalayas and the Arctic (see Hird, 2017).

Scholars investigating degrowth have so far neglected the global waste crisis[2], focusing on themes such as the pursue of happiness and well-being through non-consumptive ways e.g. labour share, less purchasing, and the investment of surplus time to family, friends and wider community, or on other aspects such as art and culture (e.g. Akbulut et al., forthcoming; Demaria et al. 2013). While many scholars researching degrowth argue that overconsumption is the main cause of long-term environmental issues and social inequalities, the relation between waste and environmental degradation is often not clear.

We argue that waste should be one of core fields of the degrowth discourse (Martinez-Alier, 2012), introducing the concept of ‘waste degrowth’ and defining it as degrowth of global material waste streams. More precisely, we define ‘waste degrowth’ as a socially sustainable and equitable reduction (and eventually elimination) of the production of materials for which a given society has no further use aside disposal. Generally, waste degrowth addresses a global movement that opposes the notion of waste as an *undesired but acceptable* outcome of non-circular modes of production and consumption (Domazet and Ančić, forthcoming). The emerging waste degrowth movement is part of a broader degrowth movement comprising anti-nuclear waste, anti-toxic waste, anti-plastic movements; all with the overarching objective of reducing and finally eliminating a range of fractions and materials which form integral parts of current non-circular economies, such as nuclear substances, toxics chemicals, plastics. Waste degrowth activists seem aware that this objective cannot be achieved by simply following ideas, trajectories and narratives related to ‘eco-efficiency’, ‘ecological modernization’, or ‘green economy’ (Asara et al., 2015). Instead, they promote radical

[2] The growth of global social metabolism is also associated with higher numbers of extraction and disposal sites, which in turn create more environmental justice conflicts (Martinez-Alier, 2012; Rodriguez-Labajos et al., forthcoming)

reconfigurations for both economic and waste management systems, mainly encouraging and supporting collaborative consumption, composting and recycling initiatives at a local level.

2.2 Waste management, policies and practices

In order to pursue effective waste management practices, local authorities and municipalities should identify the combination of waste management options that provide the best balance between environmental, economic and social needs (Petts, 2005). Any refusal material must be removed from its point of origin and safely managed, while public authorities at different political scale should collaborate for designing waste-management fees that treat citizens fairly (Batllevell and Hanf, (2008). In such context, a UP scheme provides a more equitable distribution of economic costs by comprising the polluter pays principle (PPP) and the concept of shared responsibility. The PPP identifies residents as actors in the chain of activities (e.g. production, distribution, commerce, consumption) leading to the generation of urban waste (Batllevell and Hanf, 2008). With UP, local residents pay a price based on the quantity of waste (particularly unsorted waste) they produce. Waste is measured by weight or volume, and units may be identified using different types of bags, bins, containers or even Radio Frequency Identification technology tags (RFID). UP can then provide an effective instrument in terms of achieving cost savings and, simultaneously, reduction of waste (Ferrara and Missios, 2005). In addition, UP can affect behavioural changes in the production and consumption of goods, influencing households' approaches with regard to waste management and pushing them to reduce and recycle in order to pay less, providing an effective instrument to reduce waste generation and to increase recycling rates (OECD, 2006). Other types of waste service charges not directly related to waste generation (e.g. based on number of residents in a given community, on household water consumption and/or real estate and property values, or on fixed charges or flat rates), do not create any economic incentives towards waste reduction/recycling compared to UP.

There are contrasting studies in literature about the application of UP schemes in waste management. Some studies evaluate UP schemes as very effective in view of achieving cost savings and, simultaneously, reducing waste (Ferrara and Missios, 2005). However, other studies consider UP schemes not very useful from an environmental perspective, as they may stimulate free-riding behaviours, illegal and improper practices, whose inhibition is problematic and costly (Massarutto, 2007). It is possible that UP can also lead to waste tourism (van Beukering et al., 2009) and some authors demonstrate that illegal dumping and inappropriate discharge may be a consequence of it (e.g. Kim et al., 2008).

Aside this established body of literature on the effectiveness of UP from an environmental perspective, a number of studies address its social costs and benefits. For example Manni and Runhaar (2014) undertook an extended cost-benefit analysis of economic, environmental, and social costs and benefits associated with UP, with positive outcomes with regard to waste reductions and net social benefits. Similarly, studies addressing the relationship between UP and social capital,

defined as 'networks together with shared norms, values and understandings which facilitate cooperation within or among groups' (OECD 2001, p. 42), found that free-rider behaviours in waste management can be overcome by community involvement and social cooperation (e.g. Tsai 2008). However, studies in the field generated inconsistent results, especially regarding social capital, inappropriate disposal, fairness and justice, and resistance. To shed some light on these issues, we elaborated UP by analyzing investigating processes and results in four Spanish municipalities where these schemes have been introduced.

2.3 UP schemes in Spain

In Spain, charging fees for waste produced at a local level is a common practice, although the application of fee-systems varies significantly across municipalities. Usually, waste charges are in the form of flat rates, which are frequently not directly related to waste generation (Puig-Ventosa and Sastre Sanz 2017). Unlikely to what happens in other EU member states such as Germany or the Netherlands, where UP schemes are more common, the presence of these schemes in Spain is still very limited (Weber et al., 2017). Only a fistful of municipalities have implemented UP schemes for household waste: Argentona, Miravet, Rasquera (Catalonia region); Esporles, Maria de la Salut, Binissalem, Porreres (Balearic Islands region); and Usurbil (Basque Country region). Other municipalities have applied UP schemes solely to commercial activities. Our case study included Argentona, Rasquera, Miravet and Esporles (see Figure 1).

Figure 1 and Table 1 shows the location and provides key-statistics about selected municipalities respectively. Despite the differences in size and geography, they are all tourist destinations exposed to significant seasonal influxes of non-residents (mainly during summer months) which increase pressures on local waste management systems. The sample comprises the two semi-urban municipalities: Argentona (population: 11,900) in the Barcelona Metropolitan Region, and Esporles (4,915) on the Balearic Island of Mallorca; and two small rural municipalities: Miravet (789) and Rasquera (827) in the Tarragona province south of Barcelona[3]. The selected municipalities developed a DtD collection system and UP scheme for both households and businesses; all but one[4] maintained a UP scheme until June 2017. Table 2 shows attributes and differences among schemes implemented in each municipality.

[INSERT FIGURE 1 HERE]

[INSERT TABLE 1 HERE]

[INSERT TABLE 2 HERE]

[3] Other municipalities (Maria de la Salut, Binissalem, Porreres and Usurbil) launched their UP schemes after we started data collection October 2012. For these reasons, these municipalities have not been included in our study.

The UP schemes examined in this study are based on pay-per-bag systems, with households required to buy standardised waste bags associated with the different waste fractions charged. Prices of the bags do not reflect their actual cost but the cost of collection services, and provide incentives to separate collection for recycling.

In Argentona, a DtD scheme was introduced in 2004; initially it applied to biowaste and refuse waste, and was later extended to paper-cardboard and packaging in 2008. DtD involved 8,500 residents; urban areas remained excluded from the scheme until 2017 mainly for logistic reasons. The UP scheme was gradually introduced from October 2009 and fully implemented in February 2010. At first, refuse waste and packaging were charged together with biowaste for commercial activities. The new system split the previously fixed annual fee (€151/year per household) into two parts: a flat fee (€95/year per household) and a variable fee, paid when purchasing special standardised bags for residual waste (17 litres red bags at €0.65 each) and packaging (35 litres yellow bags at €0.35 each). Larger bags for both fractions were provided for commercial activities (65 litres for residual waste and 100 litres for packaging at €2.5 and €1 respectively). In this case, an emergency area with containers for different fractions except those subjected to the variable charge was created in the municipality's outskirts, in addition to the recycling centre (Puig-Ventosa and Calaf-Forn, 2011). In 2017, the emergency area was suppressed due to inappropriate disposals.

In 2009, Esporles launched an UP scheme to improve an already present DtD scheme then applied to 85% of its residents (urban areas were excluded from both schemes due to logistic and economic issues). The previous waste charge (€140/year per household) was split into a flat fee (€90/year) and a variable fee for the residual waste only. Standardized refuse bags (10 litres) for households cost €1 per unit, whereas larger capacity bags of 50 litres are available for economic activities at €5 each. There is a recycling centre/tip operating in the area.

Finally, in January 2011, Miravet and Rasquera introduced UP schemes resembling the one originally launched at Argentona, aside the DtD schemes already introduced in 2004 by both municipalities. The new UP schemes introduced a flat fee was established at €40/year for households in the centre and at €30/year for isolated households (a previous flat rate was established at €56-60/year for households in the centre, and at €40/year for isolated household). The variable fee also depended on the consumption of standardised red bags for residual waste (17 litres at €0.70) and yellow bags for packaging (35 litres at €0.30). There were also packaging bags of 110 litres at €0.95 for commercial activities. There are no emergency areas, but each municipality has an operative a recycling centre with a specific timetable.

At both Argentona and Esporles, the local municipal councils distribute bags through local retailers, while residents in Miravet and Rasquera must obtain the bags directly from the municipal council. From January 2012, standardised bags for both refuse and packaging waste in Argentona started to be distributed to households using a per capita system (considering number of residents per household), with each household receiving a number of bags estimated upon averages calculated on

previous periods[5]. Bags are distributed at the beginning of the year, with no changes affecting fixed part of the fee related to the UP scheme. Households can purchase additional bags in local retailers. Since 2013, standardised bags for packaging are no longer compulsory for households, while the system remain the same for commercial activities. Similarly, at Rasquera, after changes in 2012 standardised bags for both residual and packaging are distributed to each household on per capita basis at the beginning of the year. Households can purchase additional bags from the local council, although standardised bags for packaging remain compulsory.

Prior to introduction the UP schemes, residents at Argentona and Esporles took part in public consultation processes to define the new waste fees. These processes were conducted with the support of technicians and specialised assistants[6]; the municipalities also offered support to residents during and after the UP implementation period, conducting a six-month intensive monitoring to verify the effectiveness of the schemes (see Section 4.1).

Figure 2 provide examples of waste fees and tariffs applied to households in the four municipalities selected. Fees among locations differ depending on the amount of generated refuse and/or packaging bags. Permanent household residents as well as non-residents spending periods of time in the municipalities, such as second-home owners, must purchase the standardise bags to cover the fixed costs of the service. In all cases, a fixed fee ensures a minimum waste charge income and help to absorb repercussions associated with inappropriate behaviours.

[INSERT FIGURE 2 HERE]

3. Methodology and data analysis

We used a case study approach (Yin, 2009), a research method widely used within waste-management research (e.g. Jones et al., 2010), to develop our study. By using both quantitative and qualitative data, we investigate individual waste management behaviours and the interplay between residents and local administrators with regard to achieving and implementing sustainable waste management solutions at a local level. The quantitative data presented are mostly based on information obtained during technical assessments and monitoring phases of the UP schemes supplied by each municipality involved in the study. These include data about waste collection as well as directly measured variables such as waste fractions densities measured inside waste bags. Qualitative data comprise interviews with local administrators and waste managers. A total of 26 interviews were conducted for this study: of these, 21 were face-to-face interviews, while four were conducted via phone and one interviewee answered the questions via email. Interviews provided valuable insights regarding changes occurred in the amount of solid waste generated within municipalities before and after the implementation of UP schemes, and about levels of recycling achieved locally.

[5] In many cases it means a substantial increase in the real number of bags needed in one year.

[6] In the case of Miravet and Rasquera, a consultation process was considered unnecessary due to the limited size of the municipality

Questions to interviewees were designed to capture views and perceptions of local policymakers, managers and administrators about UP. Topics addressed in the questions included distributive effects of waste management charges and services on households or neighbourhoods; institutional settings and objectives driving decision-making processes within municipalities; conflicts and relevant policy changes before, during and after implementation of UP schemes; and public response and acceptance of UP schemes.

A first round of five interviews was conducted in February and March 2013. In this round, authors aimed at exploring and examining social capital associated with UP schemes. A second round comprising three interviews was performed between June and September 2013. This time, questions aimed at gathering information on the practices of waste tourism and free-riding behaviours, levels of inappropriate discharge, social costs of UP schemes and social capital. A third round of ten interviews round was undertaken between July and October 2014. Questions used for these interviews focused on themes such as participatory processes, waste tourism, social capital, and the justice of UP. Finally, six interviews were conducted between March and June 2017, with the aim to validate knowledge obtained in previous rounds, and to gather deeper insights about possible purchasing consumption patterns and changes in disposal behaviour shown by residents with UP schemes. Main points and themes addressed within interviews conducted across selected municipalities are provided in Table 3.

We also conduct grounded research via means of participant observation during the implementation of UP schemes. Two of the authors involved in this study provided consultancy and advice to the four selected councils during the introduction of implementations of UP schemes. This enabled us to establish contacts and develop strong relationships with local administrators and technicians, a crucial aspect with regard to gaining access to data, and to arranging and conducting interviews. The type of observation performed was ‘moderate participation’, in which the researcher maintains a balance between being both ‘insider’ and ‘outsider’, so that levels of involvement with third parties and relations with individuals engaged in the study (local administrators, managers and residents in our case) remain under control (DeWalt and DeWalt, 2010). Moderate participation requires researchers to achieve a combination of involvement and necessary detachment in order to stay objective (DeWalt and DeWalt, 2010). Due to the challenges associated with the timing of the investigations conducted, and given that the introduction and implementation processes of UP schemes lasted less than one year in all the four locations selected, moderate participation fully suited our research purposes, enabling us to identify failures and errors made during the processes.

[INSERT TABLE 3 HERE]

4. Results

4.1 Impact of UP schemes

The introduction of UP schemes in the municipalities produced general improvements in terms of reducing total wastage, increasing recycling rates and enhancing recycling activities. Table 4 shows

results obtained with the new schemes, while Figure 3 and Figure 4 respectively show the evolution of recycling rates and changes affecting refuse waste, packaging and biowaste in all the municipalities considered. Effects associated with the introduction of DtD schemes are also reported.

In Esporles, recycling rates increased and total waste generation diminished significantly within one year from the introduction of the UP scheme. About 0.12–0.15 refuse bags per household/week were collected within the initial six weeks, stabilising to 0.16 refuse bags per household/week at the time this study is delivered. However, data show improvements already in 2006-07, after the launch of the DtD scheme. In Argentona, results show a decrease in the amount of total waste generated in 2011 compared to 2009 values in both absolute and relative terms with the introduction of the UP scheme. Residual and packaging waste decreased substantially, while biowaste decreased slightly. Recycling rates increased between 2008 and 2009 due to the extension of the local DtD scheme to two more fractions, and further increased after UP, achieving an average household bag weight between of 1.67 and 1.05 kg. These results refer to collection made in the whole municipality, albeit findings related to the area where UP was implemented cannot be disaggregated. At Rasquera and Miravet, the total amount of waste generated locally drastically diminished within two months from the introduction of the UP scheme. Recycling rates soared significantly, and the quantity of residual waste substantially decreased in relative terms between 2010 and 2012. Overall, results show lower levels of waste generation per household in these two locations compared to other municipalities.

A small number of incidents, including cases of waste tourism, were detected during the initial phases of UP schemes in all the selected municipalities, although their number drastically decreased within weeks from implementation. Some levels of waste exchange between neighbouring municipalities may have occurred due to spatial proximity, but we could not find evidence of 'rational actors' systematically transferring their refusal to other areas in order to save money. Moreover, waste tourism does not always signify a loss for the municipality where the waste is disposed, as some fractions may bring benefit in terms of recycling.

[INSERT TABLE 4 HERE]

[INSERT FIGURE 3 HERE]

[INSERT FIGURE 4 HERE]

4.2 Findings from interviews

Interviews enabled us to further explore and examine the outcomes of UP schemes, and to better understand initiatives and activities undertaken within selected municipalities with regard to increasing recycling effectiveness and tackling waste tourism. In 2012, the variable part of the fee charged for packaging waste was suppressed in Argentona; following this modification, the local council then recorded a surge in the number of incidents associated with improper disposal of non-packaging waste within the packaging waste. Similar incidents also occurred in the other three

municipalities although with far less intensity. Waste managers and administrators interviewed in this study express their views on these issues:

> *'There are for sure some people that bring their waste out of town; their number is small and they are well known, so we can put some pressure on them' [Mayor of Miravet - February 2017].*

> *'With this small modification [in 2012], the extensive packaging waste tourism ceased and we could ensure economic income, which is important in times of crisis' [Environmental Technician II, Argentona - March 2013].*

> *'When waste bags contained inappropriate waste fractions, waste collectors did not collect them, leaving a note for improper disposal to householders. Bags could remain up to two weeks on the streets: such a long time is an incident not easy to cope with from a political perspective' [Environmental councillor, Esporles - February 2013].*

Generally, residents tended to associate UP schemes with fairness and equality, and this perception increased levels of public acceptance and involvement. At Esporles, a participatory process carried out by a Local Agenda 21 Forum[7] paved the way to the UP scheme. Geographical factors related to distribution across different neighbourhoods played also a major role in designing and developing the scheme. For instance, servicing low-density areas, often characterised with family-unit houses, generates higher transport costs and more working hours compared than servicing more densely populated areas, mainly characterised by blocks of flats and houses of multiple occupancies. However, since lower income groups predominantly live in more densely populated areas, residents with flat-rate fees pay the same as residents living in wealthy, low-density areas. Although UP schemes do not overcome this problem completely, as part of the fee applied continues to be a flat rate, their introduction was generally perceived by local residents as an improvement in terms of fairness and compared to previous status quo.

> *'Within the discussions on waste management in the Agenda 21 Forum, some people were arguing that they were recycling and their neighbours were not, so why should they then be paying the same as their neighbours?' [Environmental councillor, Esporles - February 2013].*

> *'Before UP all households paid the same, independently of their behaviour in terms of recycling as well as of the number of residents - one resident households paid the same of those of two, three or even six residents' [Mayor of Miravet - February 2017].*

[7] Agenda 21 was agreed at the United Nations Earth Summit held in Rio de Janeiro (Brazil) in 1992 (UNCED, 1992) as a non-binding, voluntarily action plan which aims is to operationalize sustainable development. It includes Local Agenda 21 (LA21), and which advises local authorities about implementing sustainable development policies at a local level (UNCED, 1992)

From interviews, it appears that bottom-up governance and multi-stakeholder initiatives provided significant support to the implementation of UP schemes. Particularly at Esporles and Miravet, groups of activists, EJOs and other grassroots organisations campaigned intensively in favour to introduce UP. At Esporles, the Local Agenda 21 Forum actively promoted and supported UP schemes also in response to issues generated by overcapacity experienced by an incinerator located within council boundaries, which received and treated refusal from the whole island of Mallorca. At Miravet, where a DtD collection scheme was already in operation, a local women's organisation campaigned against illegal dumping in proximity of recycling containers, contributing significantly to the introduction of UP schemes.

These grassroots initiatives appear to have generated a high degree of social capital, unlocking resources among residents and increasing trust, cooperation and networking at a local level. Residents at Esporles and Miravet were actively involved in public debates and discussions related to design and developing the UP schemes. This enhanced environmental awareness across neighbours, bringing residents to collaborate and cooperate. The same experience was not replicated in Argentona, where the UP scheme was launched by the council with little or no public consultation. Initially, the launch raised issues among local residents due to a lack understanding on the new waste fees:

> *'When we had to increase waste fees due to overcapacity incineration, and this generated a feeling of unfairness with the problem of how to share these cost. That is when the Agenda 21 forum called for UP for Esporles' [Environmental Councillor of Esporles - February 2013].*

> *'We aim to manage our waste ourselves and we have planned a composting plant with two other municipalities to treat autonomously organic waste and to provide compost for the local agriculture sector' [Mayor of Miravet - February 2017].*

> *'In the participatory process, the problem was that only already convinced people came to listen and discuss. After that, when UP was implemented, people against the system emerged to argue the things they did not like' [Environmental Technician, Argentona - July 2014].*

5. Discussion and conclusions

The study we presented in this paper explored and examined the role of local organisations with regard to waste management, focusing on the introduction of UP schemes in four municipalities in Spain. Findings indicate that the presence of a cohesive community, and a general dissatisfaction with waste management practices, provided an incentive for developing and introducing UP in the communities considered, generating positive impact in terms of waste reduction and increasing recycling rates. Findings from our analysis also indicate UP schemes as an effective instrument in view of achieving waste degrowth (e.g. as a reduction of waste generated and disposal) as well as

waste justice (e.g. public perception of environmental benefits associated with fairer and more sustainable waste management practices). In addition, they provide empirical knowledge with regard to the role played by EJOs and other grassroots organisations in relation to launching and developing these schemes, highlighting opportunities associated and challenges with regard to set up alternative waste management systems within local communities.

The introduction of UP schemes led to a substantial reduction in solid waste and increased recycling rates in all the municipalities examined. These results are extremely relevant with regard to environmental justice and waste degrowth, corroborating those from previous studies (see Demaria, 2017) and confirming that waste degrowth should not be perceived simply as a reduction of waste flows, but more generally as a reconfiguration of waste facilities e.g. more recycling plants instead of incinerators and landfills, or DtD versus street collection from waste bins. In addition, results corroborate evidence from previous empirical studies indicating UP as an efficient instrument to reduce the environmental impacts of waste management (Ferrara and Missios 2005; OECD 2006).

Although free-riding behaviours such as waste tourism and inappropriate discharge were detected in our study, we could not find any evidence of illegal dumping, differently from other studies (Kim et al. 2008). Possibly, the occurrence of free-riding behaviours could have been prevented by a high level of social and community cohesion, based on informal norms and rule-ordered relationships. Stronger ties among residents might contribute to create a 'social repudiation' towards those not complying with the system (Tsai, 2008). Findings from this study demonstrate that, in smaller and more spatially remote communities such as Rasquera and Miravet, social capital and individual accountability were more pronounced in relation to waste management compared to other communities. This is an important aspect in terms of deontological justice, as this form of justice is bounded to duty and rules, which tend to be more abided to in communities showing stronger ties and social networks among their residents, and higher levels of reciprocity, trust, and cooperation among individuals and groups.

Findings also highlighted some aspects inherent to consequential justice. In presence of UP schemes, residents can choose between pay less due to recycling (as well as adopting measures of waste prevention); or pay more due to lax behaviour. Aside socio-economic factors related to income and neighbourhoods, residents' willingness to minimise waste depends on the availability of alternative, less waste-intensive products. Since these alternative products are priced differently, their use might not be equally accessible for all income groups. Municipalities must then consider whether all residents share the same opportunities with regard to reduce their waste and recycling, in order to design and apply fairer charges and devise payments accordingly.

In our analysis, we found that UP schemes have a wider impact on communities particularly when these schemes are backed and sustained by grassroots initiatives. The smaller towns of Rasquera and Miravet performed better with regard to reducing waste flows compared to larger towns of Argentona and Esporles. However, at Esplores and Miravet, the engagement of EJOs and grassroots organizations increased public awareness and understanding about costs and benefits

associated with UP schemes, preparing residents in these two communities and making them more willing to accept changes. Higher levels of community participation and involvement appear important when analysing UP schemes in terms of environmental justice and waste degrowth, irrespective of whether municipalities may differ with regard to attributes such as population, size and affluence. In such context, EJOs can be functional with regard to developing environmental policies and innovative instruments to address waste management, and how these can be used to achieve sustainable urban transformation. Increasing participation and involvement of local residents can help designing and implementing sustainable policies more effectively.

In light of these considerations, we argue that, while campaigning for fairer waste management practices, EJOs examined in our study have sought for both consequential and deontological justice. In terms of consequential justice, the role EJOs played in implementing community-based waste reduction schemes helped to reduce inequality in terms of distributing waste generation and incineration outcomes. With regard to deontological justice, from an environmental perspective, residents in the surveyed municipalities collectively expressed their preference for a fairer waste management system that charges households according to the amount of waste they produce. However, while UP schemes may allow for a rebalancing of waste management costs within communities, they cannot erase environmental impacts related to waste: a given household may recycle and equally generate a disproportionate amount of waste (and recycling) compared to other households with similar characteristics, creating an imbalance in waste management within the community. This demonstrates the significance of fairness in presence of UP and in view of paying in function of the quantity of waste produced (Battlevell and Hanf, 2008).

Moreover, since fairness is an important aspect also with regard to achieving environmental justice (e.g. as using or treatment of the environment, or people via the environment; Been, 1992), our analysis clearly identifies the need to acknowledge the usefulness and effectiveness of PPP systems, such as UP schemes, when addressing issues concerning environmental justice. Nevertheless, introducing and managing UP schemes often require significant resources and investments for local councils to prepare the necessary infrastructures and to increase residents' awareness. This applies also to countries with solid waste management policies and consolidated practices, where UP schemes may be already in place (Morlok et al., 2017).

In conclusion, findings from this study can provide two main insights to municipalities intending to introduce UP schemes. Firstly, bottom-up participatory processes should be sustained and encouraged. Improving awareness among local residents about environmental effects of waste production would be the initial step to make. Secondly, during introduction and early implementation phases, funds should be made available to encourage communities in developing their own unit-pricing solutions. In particular, financial support made available by national governments and local authorities would help to increase efficiency and success of UP schemes. Given the paucity of empirical studies on UP schemes on small communities, the insights gathered from our analysis provide a substantial contribution to the field. For instance, the experiences of the

four municipalities selected for this study can serve as example for other municipalities in Spain and elsewhere, and can provide comparative ideas and frameworks with regard to designing and delivering UP schemes for policymakers at different level of governance. In addition, our study can serve as a platform for ignite research on UP schemes in other countries, increasing the amount of empirical evidence on the effectiveness and efficacy of these schemes with regard to addressing and achieving waste degrowth, and widening the general understanding about the type and value of contribution UP schemes provide to the global waste justice movement.

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Tables:

Table 1. Information about selected municipalities

Municipality	Region	Province	Population	Distance From Capital	Type	GDP/ capita (€)	Unemployment Rate	Population Density
Argentona	Catalonia	Barcelona	11,900	35km	Urban	28,355	9,3%	474/km²
Rasquera	Catalonia	Tarragona	827	170km	Rural	18,426	6,4%	16/km²
Miravet	Catalonia	Tarragona	789	170km	Rural	18,426	10,5%	23/km²
Esporles	Balearic Islands	Mallorca	4,915	15km	Mixed	29,685	5,4%	133/km²

(Source: El Pais 2016, Datosmacro 2017)

Table 2. Main characteristics of UP schemes in selected municipalities.

Municipality	Year	Population affected	Fractions charged	Previous waste fee	Flat rate	Variable rate	Changes of the scheme	Recycling centre location
Esporles	2009	85% (4,000)	Refuse waste	140 €/year	90 €/year	• Red household bags (10 litres; 1.00 €/each) • Red commercial bags (50 litres; 5.00 € each)	-	In the outskirts of Esporles
Argentona	2010	70% (8,500)	Refuse waste Packaging waste Biowaste (for commercial activities by pay-per-can)	151 €/year	95 €/year	**Refuse waste:** • Red household bag (17 litres; 0.65 €/each) • Red commercial bags (65 litres; 2.50 € each) **Packaging waste:** • Yellow household bag (35 litres; 0.35 €/each) • Yellow commercial bags (100 litres; 1.00 € each)	• Bags distributed to household per capita (2013) • Packaging bag for households suppressed(2013)	• Emergency areas for non-target waste fractions*; • Annexed recycling center for target fractions **
Miravet	2011	100% (789)	Refuse waste Packaging waste	• Urban Households: 56-60 €/year • Isolated household: 40 €/year	• Urban Households: 40 €/year • Isolated Household: 30 €/year	**Refuse waste:** • Red household bag (17 litres; 0.70 €/each) • Red commercial bags (65 litres) – 2.50 € each **Packaging waste:** • Yellow household bag (35 litres; 0.30 €/each) • Yellow commercial bags (110 litres) – 0.95 € each	-	A recycling center for all fractions near the center.
Rasquera	2011	100% (827)	-	-	-	-	Bags distributed to household per capita (2012)	A recycling center for all fractions.

*Free of charge for residents; ** not free

Sources: ARC and ENT 2010, authors elaboration

Table 3. Main points gathered from interviews

Themes and issues	Esporles	Argentona	Rasquera	Miravet
Distributional effects of UP	• *Issues between periphery and centre*	• *UP flat rates do not consider size (e.g. small houses charged as large ones);* • *Number of residents used as unique criteria, with some reductions with low-income families*	-	• *No difference in charge between higher and lower household incomes. New rates are based on household expenditure but waste charges do not vary significantly*
Conflicts related to waste management implementation and practices	• *Overcapacity incineration generated concerns among residents; that led A21 forum to call for UP*	• *Much opposition to UP scheme.* • *UP present in electoral manifestos but waved by opposing parties to gather short-term wins* • *No major conflicts/opposition to UP since local policymakers were determined to implement it*	• *UP not implemented for economic reasons, but mainly for political ones*	• *No past/present political struggle or opposition around the waste management service; ruling political party in the municipality enjoys support from the local community* • *The Women Association of Miravet complained about dumping around containers, proposing an alternative DtD which was well received.*
Participatory processes	• *LA21 facilitated residents' participation in the municipality's management*	• *UP promoted by Local Government: initial complaints disappeared over time* • *Participatory process mainly involved those supporting UP: naysayers came forward only once UP implemented.*	• *UP implemented by local council with the Consortium for waste management of three supra-municipal regions* • *Vast majority of residents actively supported and engaged with the UP*	• *No participatory process needed as majority of residents expressed consensus during the implementation of DtD.*
Efficiency/ Effectiveness of collection processes	• *Often shops run out of waste bags; neither them nor municipality were concerned about it*	• *When municipality started to deliver refuse bags to households, some families were introduced to the UP scheme for the first time*	• *All emergency areas have been suppressed to avoid illegal disposal, with positive results*	-
Negative externalities	• *UP led to waste tourism*	• *Waste tourism increased with DtD*	• *Some residents did not engage with UP also due to issues related to systems applied in five different surrounding areas*	• *At the beginning of UP some residents dumped/disposed their waste in other municipalities*
Lesson learnt, things to improve and future plans	• *UP increased awareness among residents of municipality costs related to waste treatment*	• *UP improved recycling and reduced collection of refuse for incineration drastically*	• *UP scheme found fairer than previous flat rate although high density areas should have a lower rates compared to low density areas in relation to their collection costs (now unique fix rate applied to all)*	• *Plans to build a composting plant (with two other municipalities) to treat organic waste autonomously to provide compost for local farmers*

Table 4. Main results of UP considered in this study.

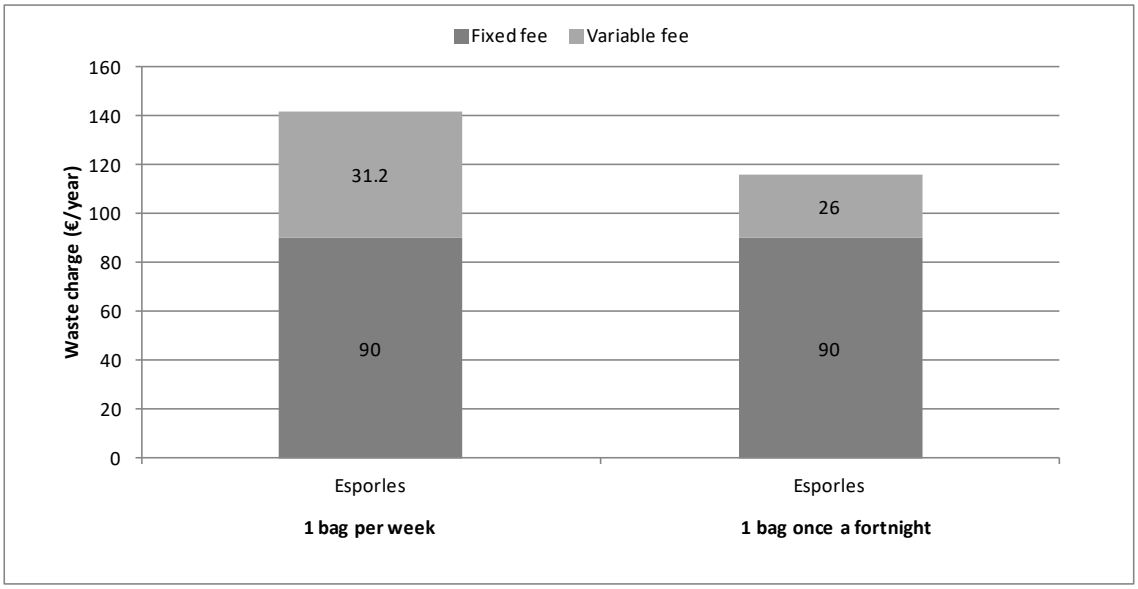
Feature analysed		Esporles	Argentona	Rasquera	Miravet
Period of time analysed		2008 to 2009	2009 to 2011	2010-2011-2012	
Change in total waste	Total kg of waste generation	-23%	-8.9%	1st year: -19% 2nd year: +8.5%	1st year: -18% 2nd year: +4%
	Per capita generation (kg/inhab·day)	-24.7% (0.93 to 0.70)	-15% (1.67 to 1.42)	-8.5% (0.78 to 0.72)	-14.1% (0.78 to 0.67)
Change in recycling rate		46% to 73%	64.3 to 68.5%	65.3% to 77.6%	80% to 87.6%
Change in per capita generation (g/inhab·day)	Residual waste	-62.2% (500 to 189)	-21.1% (593 to 468)	-41% (272 to 161)	-47% (157 to 83)
	Packaging waste	+14.4% (85 to 97)	-18.4% (76 to 62)	+14% (64 to 72)	+4.2% (66 to 69)
	Biowaste	+43.2% (156 to 223)	-2.3% (347 to 340)	+9% (212 to 231)	-11% (316 to 280)
Number of bags per household per week	Refuse waste	0.16	0.3	0.089	0.106
	Packaging waste		0.8	0.187	0.243
Density (kg/l)	Refuse waste	0.113	0.098	0.088	0.088
	Packaging waste		0.03	0.039	0.039
Percentage of bags incorrectly delivered	Refuse waste	1.5%	7%	11%	1%
	Packaging waste	-	3%	3%	3%

Figures:

Figure 1. The four municipalities selected for the study

Source: Authors' own elaboration

Figure 2. Effects of UP in the first year of implementation.



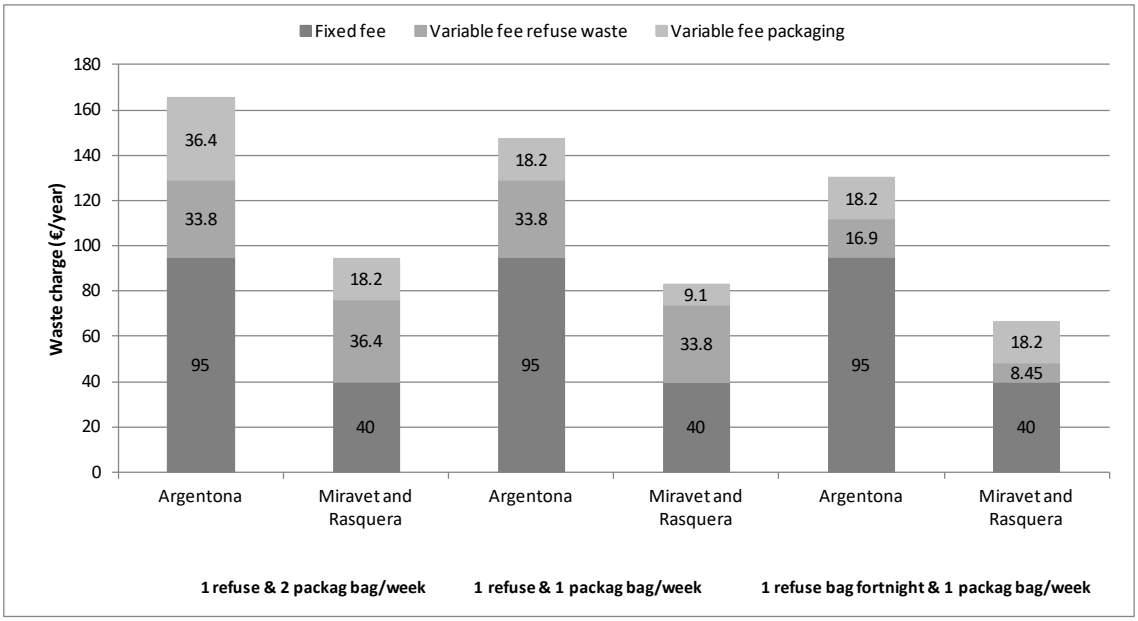
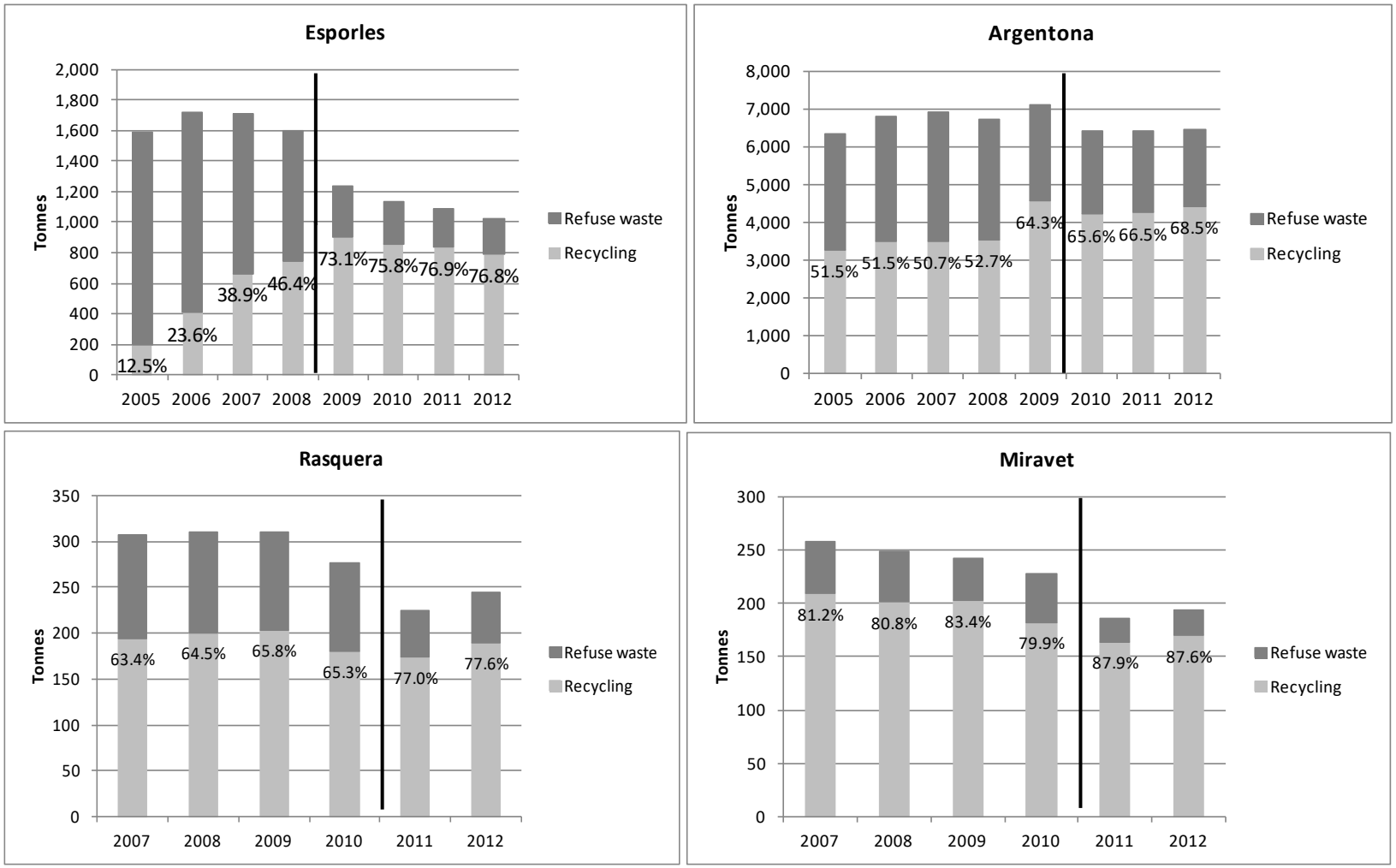
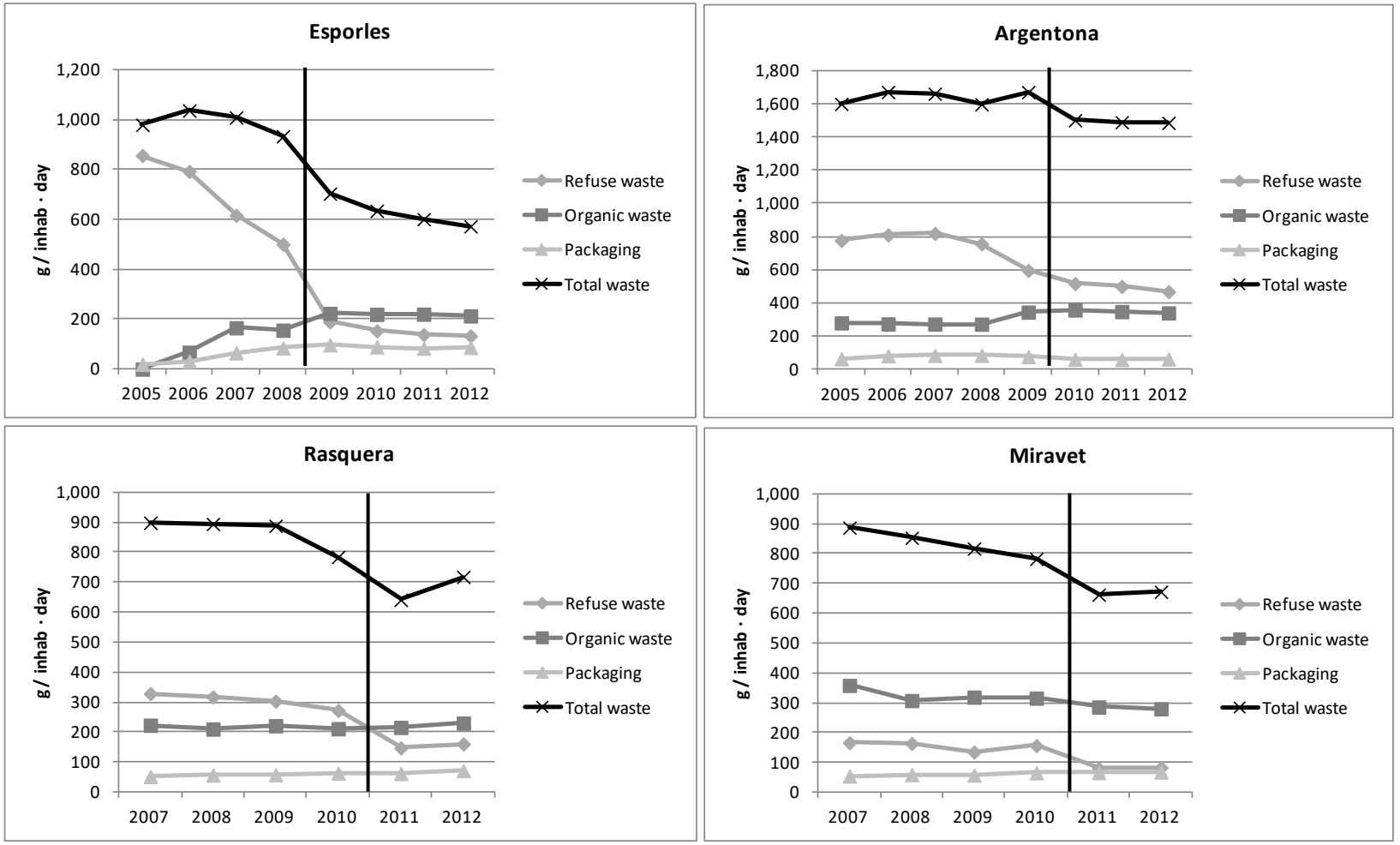


Figure 3. Evolution of waste recycling and total waste in selected municipalities*.



* The vertical lines indicate the introduction of UP.

Figure 4. Evolution of per capita waste generation and per capita refuse/organic/packaging fractions in selected municipalities.



* The vertical lines indicate the introduction of UP.